RIGOL

DG800 Pro Series

Function/Arbitrary Waveform Generator

Data Sheet

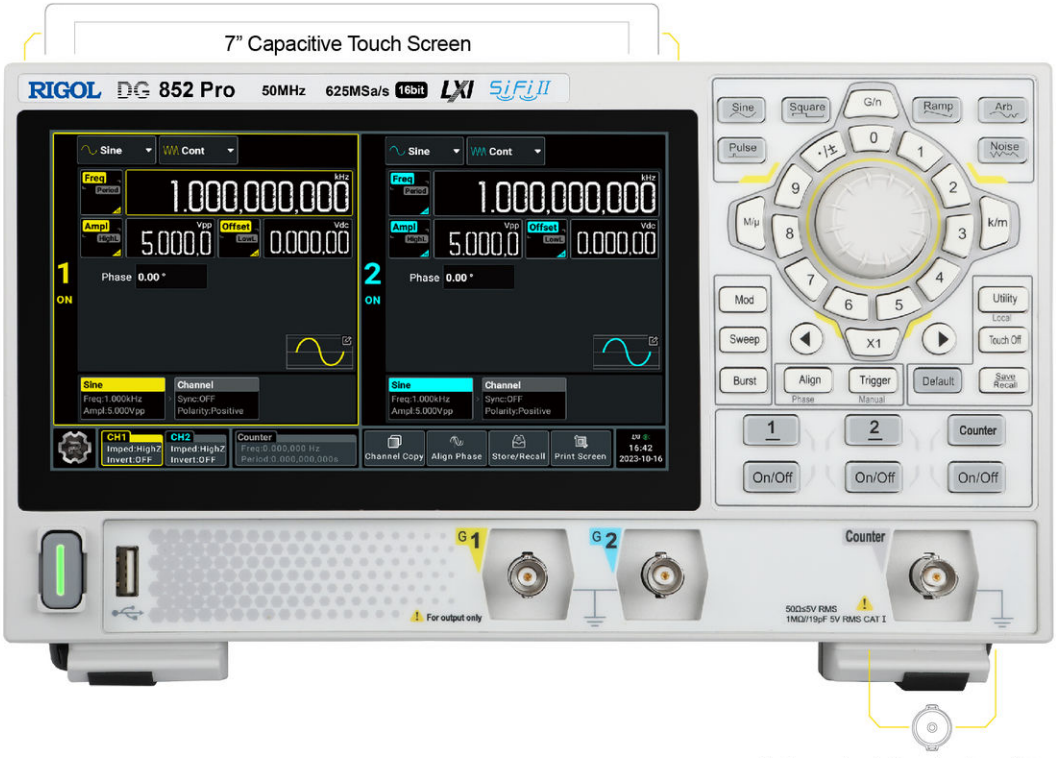
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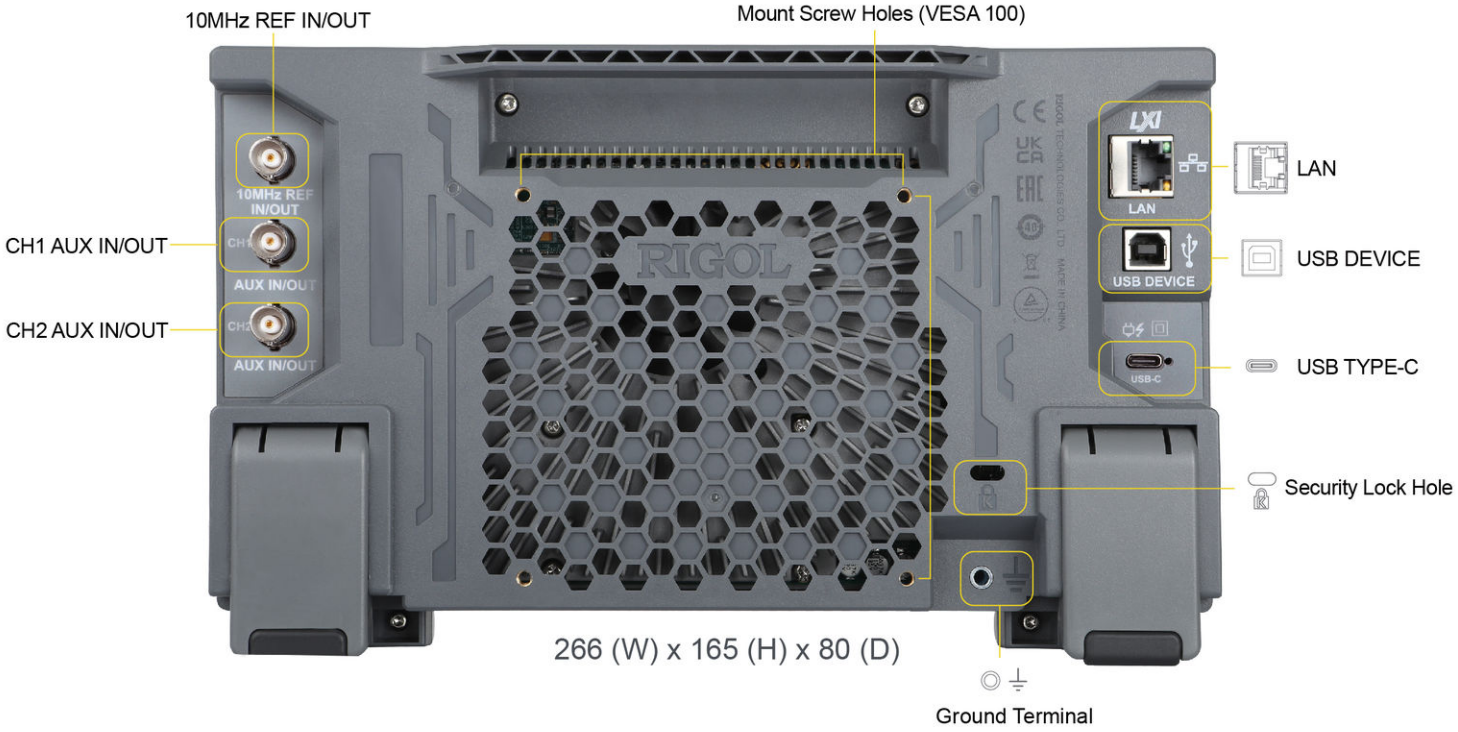
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DG800 Pro Series

Function/Arbitrary Waveform Generator

Delicate Design, Full Functionality





Application Scenarios

With a compact size, this series is highly portable for use in various working environments, either on your workbench, in the classroom, or in the field.

The rear-panel mount screw holes (VESA 100×100) allow you to fix the instrument to a compatible bracket, saving valuable space on your bench.

It can be powered by the mobile power source via its Type-C power interface, satisfying your testing requirements in the field.



Product Features

High Cost Performance

It provides 16-bit vertical resolution, up to 625 MSa/s sample rate and 50 MHz output frequency. The rise time is as low as 3 ns. It is a cost-effective choice among entry-level signal generators.

Frequency Counter

It provides a standard 7-digit counter with a max. frequency of 500 MHz. Equipped with an independent input connector for counter measurements, it provides a more simplified and accurate way to measure frequencies.

Various Modulation Types

It supports various analog and digital modulation types including AM, FM, PM, ASK, FSK, PSK, and PWM. Both internal and external modulation sources are available for different test scenarios.

Multiple Built-in Waveforms

It has multiple built-in waveforms, covering the frequently used signals in engineering, medical electronics, mathematics, and other fields.

Standard Sequence Mode

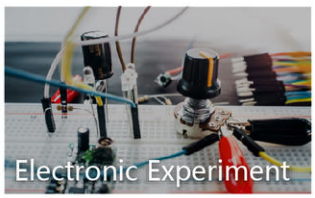
It supports a sequence that is a combination of multiple waveforms (1 to 64). The total length is up to 2 Mpts/CH (8 Mpts/CH optional).

Multiple Connectivity Options

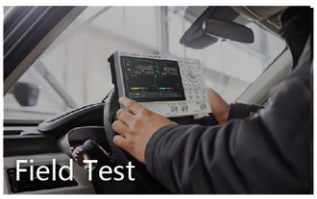
It provides various interfaces including USB Host, USB Device, and LAN (LXI Core 2011 Device). Besides, it allows you to control the instrument remotely via Web Control.



Applications









Product Features

Product Features

- Max. sample rate: 625 MSa/s
- Max. output frequency: 50 MHz
- 16-bit vertical resolution
- Arbitrary waveform editing function with a max. Arb waveform length of 2 Mpts/CH (8 Mpts/CH optional)
- Built-in high-order harmonic generator (max. 20th order)
- Independent signal frequency measurement channel with a max. frequency of 500 MHz
- USB and LAN interfaces for remote connection
- Type-C power interface for powering the instrument with mobile power source, satisfying testing requirements in the field
- Standard Web Control function for easier remote cooperation

DG800 Pro series Function/Arbitrary Waveform Generator provides up to 625 MSa/s sample rate and 2 Mpts/CH memory depth (standard). It is a cost-effective function/arbitrary waveform generator that combines multiple functions including Function Generator, Arbitrary Waveform Generator, Noise Generator, Pulse Generator, Harmonic Generator, Analog/Digital Modulator and Counter.

Specifications

Specifications are valid under the following conditions:

The instrument is within the calibration period and has been running ceaselessly for over 20 minutes under the specified operating temperature (23℃ ± 5℃).

All specifications are guaranteed except the parameters marked with "Typical".

Technical Specifications

Technical Specifications			
Model	DG821 Pro	DG822 Pro	DG852 Pro
Max. Frequency	25 MHz	25 MHz	50 MHz
No. of Channels	1	2	2
Sample Rate	625 MSa/s		
Vertical Resolution	16 bits		
Waveform Memory Depth	2 Mpts/CH (standard), 8 Mpts/CH (optional)		

Waveform Output

Waveform Output	
Output Mode	Continuous, Modulation, Sweep, Burst, Sequence
Standard Waveform	Sine, Square, Ramp, Pulse, Noise, Arb, Harmonic
Built-in Arb Waveform	148 types of waveforms, including Sinc, Exponential Rise, Exponential Fall, ECG, Gaussian, HaverSine, and Lorentz.

Frequency Characteristics

Frequency Characteristics			
	DG821 Pro	DG822 Pro	DG852 Pro
Sine	1 μHz to 25 MHz	1 μHz to 25 MHz	1 μHz to 50 MHz
Square	1 μHz to 20 MHz	1 μHz to 20 MHz	1 μHz to 40 MHz
Ramp	1 μHz to 1 MHz		
Pulse	1 μHz to 10 MHz	1 μHz to 10 MHz	1 μHz to 25 MHz

Frequency Characteristics			
	DG821 Pro	**DG822 Pro**	**DG852 Pro**
Arb	1 µHz to 10 MHz	1 µHz to 10 MHz	1 µHz to 15 MHz
Harmonic	1 mHz to 10 MHz	1 mHz to 10 MHz	1 mHz to 25 MHz
Sequence	1 µSa/s to 312.5 MSa/s		
Noise (-3 dB)	Typical (0 dBm), >250 MHz bandwidth		
Output Frequency Resolution	1 µHz or 12 digits		
Accuracy	$\pm 10^{-6}$ of the setting (except Arb and sequence), 0℃ to 40℃ $\pm 10^{-6}$ of the setting ± 1 µHz (Arb and sequence), 0℃ to 40℃		

Output Characteristics

Output Characteristics	
Amplitude Range (into 50 Ω)	1 mVpp to 10 Vpp
Amplitude Range (into HighZ)	2 mVpp to 20 Vpp
Amplitude Accuracy[1]	±(1% of setting + 2 mVpp) (into 50 Ω) ±(1% of setting + 5 mVpp) (into HighZ)
Amplitude Resolution	0.1 mVpp, 0.1 mVrms, 1 mV, 0.1 dBm or 4 digits (whichever is lower)
Amplitude Unit[2]	Vpp, Vrms, dBm, V
Offset Range	±5 Vpk (ac + dc) (into 50 Ω) ±10 Vpk (ac + dc) (into HighZ)
Offset Accuracy	±(1% of |setting| + 2 mV + 0.5% of amplitude (Vpp)) (into 50 Ω) ±(1% of |setting| + 5 mV + 1% of amplitude (Vpp)) (into HighZ)
Offset Resolution	1 mV or 4 digits
Output Impedance	Typical (0 dBm, 0 Vdc), 50 Ω ± 1%
Protection	Waveform outputs are automatically disabled when overloaded

Signal Characteristics

Signal Characteristics		
Sine (50 Ω)	Harmonic Distortion	Typical (0 dBm) 10 Hz to <10 MHz: <-55 dBc ≥10 MHz: <-50 dBc
	Total Harmonic Distortion (THD)	Typical (1 Vpp) 10 Hz to 20 kHz: <0.1%
	Spurious (non-harmonic)	Typical (1 Vpp) 10 Hz to <10 MHz: <-65 dBc ≥10 MHz: <-60 dBc
	Phase Noise	Typical (1 Vpp, 10 kHz) 20 MHz: <-110 dBc/Hz
	Residual Clock Noise	Typical (0 dBm), -60 dBm
	Interchannel Crosstalk	Typical (1 Vpp, 0 V) <-75 dBc
	Amplitude Flatness	Typical (relative to 1 kHz Sine, 0 dBm) <10 MHz: ±0.1 dB ≥10 MHz: ±0.2 dB
	Phase	-360° to +360°, 0.01° resolution
Square	Rise/Fall Time	Typical (≤2 Vpp amplitude, 50 Ω load), ≤3 ns
	Overshoot	Typical (0 dBm amplitude, >1 kHz frequency), <5%
	Jitter (rms)	Typical (0 dBm amplitude, >1 kHz frequency), 200 ps
	Phase	-360° to +360°, 0.01° resolution
Ramp	Linearity	Typical (1 kHz frequency, 1 Vpp amplitude, 100% symmetry) ≤0.1% of peak output (10% to 90% amplitude)
	Symmetry	0% to 100%
	Phase	-360° to +360°, 0.01° resolution

Signal Characteristics		
Pulse	Pulse Width	9 ns to (pulse period - 9 ns)
	Pulse Width Resolution	100 ps or 5 digits
	Duty Cycle	0.01% to 99.99%
	Rise/Fall Time	3 ns to 0.625*pulse period
	Delay Time	0 ps to period – [pulse width + 0.8*(Leading Edge Time + Trailing Edge Time)] (Continuous mode)
	Overshoot	Typical (0 dBm amplitude, >1 kHz frequency), <5%
	Jitter (rms)	Typical (0 dBm amplitude, >1 kHz frequency), 200 ps
	Phase	-360° to +360°, 0.01° resolution
Noise	Type	White noise
Arb	Rise/Fall Time	Typical (<1 Vpp amplitude), ≤5 ns
	Jitter (rms)	Typical (0 dBm amplitude, >1 kHz frequency), 200 ps
	Phase	-360° to +360°, 0.01° resolution
Harmonic Output	Harmonic Order	≤20
	Harmonic Type	Order, Combine
	Harmonic Amplitude	The amplitude of each order of the harmonic can be set.
	Harmonic Phase	The phase of each order of the harmonic can be set.

Modulation Characteristics

Modulation Characteristics	
Modulation Type	AM, FM, PM, ASK, FSK, PSK, PWM, SUM

Modulation Characteristics		
AM	Carrier Waveform	Sine, Square, Ramp, Arb (except DC)
	Modulation Source	Internal/External
	Internal Modulating Waveform	Sine, Square, Triangle, UpRamp, DnRamp, Noise, Arb
	Modulation Depth	0% to 120%
	Internal Modulation Frequency	1 mHz to 1 MHz
FM	Carrier Waveform	Sine, Square, Ramp, Arb (except DC)
	Modulation Source	Internal/External
	Internal Modulating Waveform	Sine, Square, Triangle, UpRamp, DnRamp, Noise, Arb
	Internal Modulation Frequency	1 mHz to 1 MHz
PM	Carrier Waveform	Sine, Square, Ramp, Arb (except DC)
	Internal Modulation Source	Internal/External
	Internal Modulating Waveform	Sine, Square, Triangle, UpRamp, DnRamp, Noise, Arb
	Internal Modulation Frequency	1 mHz to 1 MHz
	Phase Deviation	0° to 360°, 0.01° resolution
ASK/FSK/PSK	Carrier Waveform	Sine, Square, Ramp, Arb (except DC)
	Modulation Source	Internal/External
	Internal Keying Frequency	1 mHz to 1 MHz
	No. of Levels	2

Modulation Characteristics		
PWM	Carrier Waveform	Pulse
	Modulation Source	Internal/External
	Internal Modulating Waveform	Sine, Square, Triangle, UpRamp, DnRamp, Noise, Arb
	Internal Modulation Frequency	1 mHz to 1 MHz
	Width Deviation	0% to 49.99% of the pulse period
SUM	Carrier Waveform	Sine, Square, Ramp, Arb (except DC)
	Sum Source	Sine, Square, Ramp, Noise, Arb, channel waveform
	Sum Ratio	0% to 100% of the amplitude setting (Vpp)

Burst Characteristics

Burst Characteristics	
Carrier Waveform	Sine, Square, Ramp, Noise, Arb (except DC)
Burst Count	1 to 1,000,000/Infinite
Internal Burst Period	4 µs to 8000 s
Burst Phase	-360° to +360°, 0.01° resolution
Trigger Delay	0 ns to 20 s
Gate Source	External trigger
Trigger Source	Internal, External leading edge, external trailing edge, Manual

Sweep Characteristics

Sweep Characteristics	
Type	Linear, Log, Step
Carrier Waveform	Sine, Square, Ramp, Arb (except DC)
Sweep Time	1 ms to 250,000 s

Sweep Characteristics	
Start/Stop Frequency	Consistent with the upper/lower limit of the corresponding carrier frequency
Hold/Return Time	0 s to 3600 s
Orientation	Up/Down
Trigger Source	Internal, External leading edge, external trailing edge, Manual
Mark	Falling edge of the sync signal (programmable)

Sequence Characteristics

Sequence Characteristics	
Sample Rate	1 μSa/s to 312.5 MSa/s
Sample Rate Accuracy	10^{-6} Sa/s
Sample Rate Resolution	1 μSa/s or 12 digits
Sequence Length	32 pts/CH to 2 Mpts/CH (8Mpts/CH optional)
No. of Waveform Entries	64
Loop	0 to 256
Filter Mode	Normal, Step, Interpolation

Frequency Counter

Frequency Counter	
Measurement Function	Frequency, period, positive pulse width, negative pulse width, duty cycle
Input Impedance	50 Ω ± 2%, 1 MΩ ± 5%
Counter Accuracy	0 to 250 MHz: 7 digits 250 MHz to 500 MHz: 6 digits
Trigger Level	0 V

Frequency Counter		
Input Coupling Mode	50 Ω Load	DC coupling
	1 MΩ Load	AC/DC coupling
Input Amplitude	50 Ω Load	100 mVpp to 2 Vpp
	1 MΩ Load	500 mVpp to 5 Vpp (Vac + dc)
Input Disruptive Level	50 Ω Load	4 Vpp
	1 MΩ Load	5 Vpp
Input Frequency Range Mode	50 Ω Load	0 to 250 MHz 250 MHz to 500 MHz
	1 MΩ Load	0 to 250 MHz
Effective Signal Frequency	50 Ω Load	DC to 500 MHz
	1 MΩ Load	DC to 250 MHz (DC coupling)
HF Reject		60 kHz/None (available only for 1 MΩ load)
Connector		BNC, on the rear panel

AUX IN/OUT Characteristics

AUX IN/OUT Characteristics		
External Modulation Input	Input Range	ASK, FSK, PSK: 3.3 V logic level AM, FM, PM, PWM: ±5V full range
	Frequency Range	DC to 100 kHz (1 MSa/s)
	Input Impedance	10 kΩ ± 10%

AUX IN/OUT Characteristics		
External Trigger/ Gated Burst Input	Level	TTL-compatible
	Impedance	10 kΩ ± 10%
	Edge	Positive/negative(selectable)
	Min. Pulse Width	100 ns
	Trigger Delay Range	0 ns to 20 s
	Trigger Delay Resolution	100 ps or 5 digits
	Jitter (rms)	Typical (trigger input to signal output, Burst mode), 1.5 ns
Trigger Output	Level	TTL-compatible
	Output Impedance	50 Ω ± 5%
	Jitter (rms)	Typical (Continuous mode), 1.5 ns
Sync Output	Level	TTL-compatible
	Impedance	50 Ω ± 5%

10 MHz Reference In/Out Characteristics

10 MHz In/Out Characteristics		
External Reference Input	Impedance	1 kΩ
	Input Coupling	AC coupling
	Required Input Voltage	100 mVpp to 5 Vpp
	Lock Range	10 MHz ± 100 Hz
Internal Reference Output	Impedance	50 Ω
	Output Coupling	AC coupling
	Level	Typical (50 Ω Load), 1.2 Vpp

Protection

Protection	
Overvoltage Protection	Occurred when: The instrument amplitude setting is greater than 4 Vpp or the output AC + DC is greater than |2 Vdc| and the input voltage is greater than ±12 x (1 ± 5%)V (<10 kHz). Disruptive voltage: ±18(Vac + dc) The instrument amplitude setting is less than or equal to 4 Vpp or the output AC + DC is less than |2 Vdc| and the input voltage is greater than ±2.5 x (1 ± 5%)V (<10 kHz). Disruptive voltage: ±3.5(Vac + dc)

NOTE:

[1]: 1 kHz Sine, amplitude > 1 mVpp, 0 V offset, unit: Vpp

[2]: dBm is available only when the load impedance is not set to HighZ; Vrms is not available for Arb; Vpp and V (high level and low level) are available for all waveform types.

General Specifications

Characteristics

Characteristics	
Display	7-inch touch screen, 1024 x 600 resolution
Stabilization Time	At least 20-minute warm-up
Internal Non-volatile Memory	32 GB

Power Supply

Power Supply	
Power Interface	USB Type-C Interface
Input Voltage	USB PD 15 V, 3 A
Consumption	45 W (max.)

Interface

Interface	
LAN	1 at rear panel, 10/100 BASE-T port, supporting LXI-C
Web Control	Support Web Control (input the IP address of the instrument into the Web browser to display the operation interface)
USB Host	1 at front panel
USB Device	1 at rear panel, supporting TMC

Mechanical Characteristics

Mechanical Characteristics	
Dimension	266 mm (W) x 165 mm (H) x 80 mm (D)
Weight	Package excluded: <1.78 kg
	Package included: <2.78 kg

Environment

Environment		
Temperature Range	Operating	0℃ to +40℃
	Non-operating	-20℃ to +60℃
Humidity Range	Operating	0℃ to +40℃, ≤80% RH (without condensation)
	Non-operating	-20℃ to 40℃, ≤90% RH (without condensation)
		below 60℃, ≤80% RH (without condensation)
Altitude	Operating	Below 3,000 m
	Non-operating	Below 12,000 m

Regulation Standards

Regulation Standards		
Electromagnetic Compatibility	Compliant with EMC Directive (2014/30/EU), compliant with or higher than the standards specified in EN 61326-1: 2013, EN 61326-2-1:2013, EN IEC 61000-3-2:2019+A1, EN 61000-3-3:2013+A1:2019	
	CISPR 11:2009+A1 Class A	
	EN IEC 61000-3-2:2019+A1	Harmonics, Class A
	EN 61000-3-3:2013+A1:2019	Voltage flicker
	EN 61000-4-2:2009	±4.0 kV (contact discharge), ±8.0 kV (air discharge)
	EN 61000-4-3:2006+A1+A2	10 V/m (80 MHz to 1 GHz); 3 V/m (1.4 GHz to 6 GHz)
	EN 61000-4-4:2004+A1	2 kV power cord
	EN 61000-4-5:2006	1 kV (phase-to-neutral voltage); 2 kV (phase-to-earth voltage); 2 kV (neutral-to-earth voltage)
	EN 61000-4-6:2009	10 V, 0.15 MHz to 80 MHz
	EN 61000-4-11:2004	Voltage dip: 0% UT during half cycle; 0% UT during 1 cycle; 70% UT during 25 cycles Short interruption: 0% UT during 250 cycles
Safety	EN 61010-1:2010+A1:2019 IEC 61010-1:2010+A1:2016 UL 61010-1: 2012 R7.19 CAN/CSA-C22.2 NO. 61010-1-12 + GI1 + GI2 (R2017) + A1	
Vibration	Meets GB/T 6587; class 2 random Meets MIL-PRF-28800F and IEC60068-2-6; class 3 random	
Shock	Meets GB/T 6587-2012; class 2 random Meets MIL-PRF-28800F and IEC 60068-2-27; class 3 random (in non-operating conditions: 30 g, half sine, 11 ms duration, 3 shocks along the main axis, a total of 18 vibrations)	

Warranty and Calibration Interval

Warranty and Calibration Interval	
Warranty	3 years (excluding the accessories)
Recommended Calibration Interval	12 months

Order Information and Warranty Period

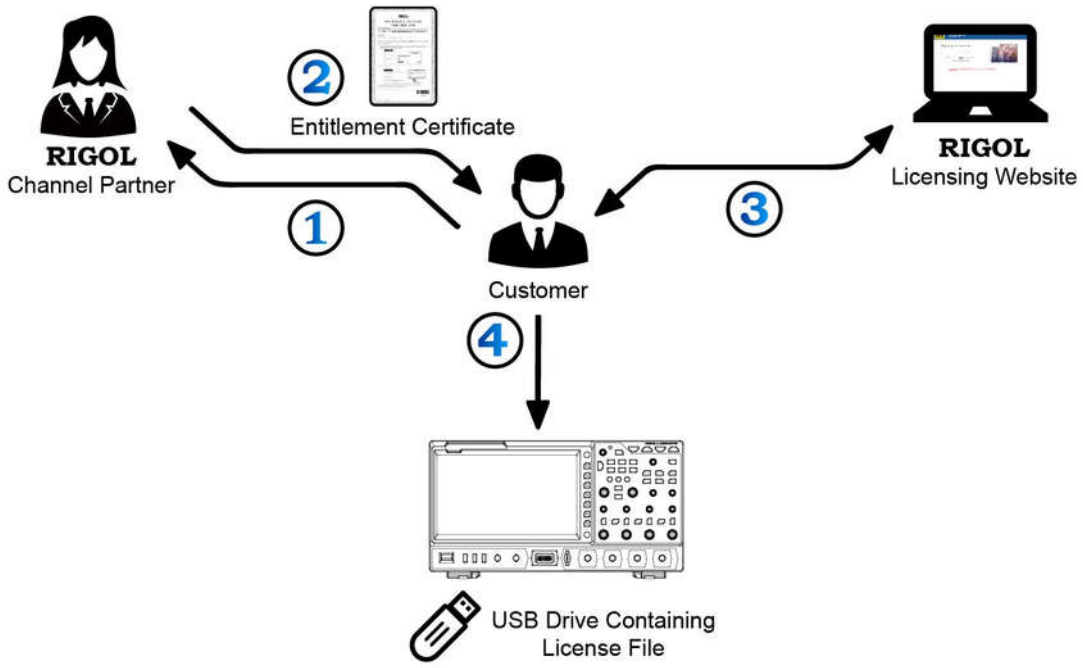
Order Information

Order Information	Order No.
Model	
25 MHz Bandwidth, 625 MSa/s Sample Rate, Single-channel	DG821 Pro
25 MHz Bandwidth, 625 MSa/s Sample Rate, Dual-channel	DG822 Pro
50 MHz Bandwidth, 625 MSa/s Sample Rate, Dual-channel	DG852 Pro
Standard Accessories	
Power Adaptor Conforming to the Standard of the Destination Country	— —
USB Cable	— —
One BNC Cable	CB-BNC-BNC-MM-100
Upgrade Options	
8 Mpts/CH Memory Depth Upgrade Option	DG800Pro-3RL
Two-channel Upgrade Option (for DG821 Pro only)	DG800Pro-DCH
Optional Accessories	
40 dB Attenuator (50 Ω, 1 W)	RA5040K

Warranty Period

Three years for the mainframe, excluding the accessories.

Option Ordering and Installation Process



1. According to the usage requirements, please purchase the specified function options from **RIGOL Sales Personnel**, and provide the serial number of the instrument that needs to install the option.
2. After receiving the option order, the **RIGOL** factory will mail the paper software product entitlement certificate to the address provided in the order.
3. Log in to **RIGOL** official website for registration. Use the software key and instruments serial number provided in the entitlement certificate to obtain the option license code and the option license file.
4. Download the option license file to the root directory of the USB storage device, and connect the USB storage device to the instrument properly. After the USB storage device is successfully recognized, the **Option install** menu is activated. Press this menu key to start installing the option.

HEADQUARTER

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